This listing of claims will replace all prior versions of claims in the present application:

Listing of Claims:

1. (currently amended) A method of writing a light guiding structure in a bulk glass substrate comprising:

   a) selecting a bulk glass substrate made from a soft silica-based material having an annealing point less than about 1380°K; and

   b) focusing a pulsed laser beam at a focus within said substrate while translating the focus relative to the substrate along a scan path at a scan speed effective to induce an increase in the refractive index of the material along the scan path relative to that of the unexposed material while incurring substantially no laser induced breakdown of the material along the scan path.

2. (original) The method of claim 1 wherein said material has an annealing point lower than about 1350°K.

3. (original) The method of claim 2 wherein the material has an annealing point lower than about 1325°K.

4. (original) The method of claim 2 wherein the material is substantially transparent to the laser wavelength.

5. (currently amended) The method of claim 2 wherein the material has a ratio of ~~the~~ band gap ~~of the material~~ to ~~the~~ energy of the laser irradiation ~~is~~ of at least about 5.

6. (original) The method of claim 2 wherein the peak intensity of said laser beam at the focus is at least about 10^{14} W/cm^2.

7. (original) The method of claim 2 wherein the material includes a first dopant selected from the group consisting of GeO_2, B_2O_3, Al_2O_3 and P_2O_5.

8. (original) The method of claim 7 wherein said material further includes a second dopant different in composition from said first dopant, said second dopant being selected from the group consisting of GeO_2, B_2O_3, Al_2O_3, and P_2O_5.

9. (currently amended) The method of claim 2 wherein the laser beam has a pulse duration ~~is~~ from about 18 fs to less than 120 fs.

10. (currently amended) The method of claim 2 wherein the laser beam has a pulse repetition rate ~~is~~ from about 1 kHz to less than 200 kHz.

11. (currently amended) The method of claim 2 wherein the laser beam has a pulse energy ~~is~~ within the range from about 1 nJ to about ~~10~~ 1 μJ.

12. (currently amended) The method of claim 11 wherein the pulse energy of the laser beam is ~~within the range from~~ about 1 μJ or less ~~to about 4 μJ~~.

13. (currently amended) The method of claim 11 wherein the pulse energy of the laser beam is within the range from about 1 nJ to about 10 nJ.

14. (original) The method of claim 2 wherein the scan speed is greater than 20 μm/s and less than about 500 μm/s.

15. (original) The method of claim 2 wherein the focus is translated relative to the substrate in a scan direction that is substantially parallel to the laser beam.

16. (original) The method of claim 2 wherein the focus is translated relative to the substrate in a scan direction that is substantially perpendicular to the laser beam.

17. (original) The method of claim 2 wherein the focus is translated relative to the substrate in three dimensions.

18. (currently amended) The method of claim 2 wherein ~~the diameter of~~ the light guiding structure ~~is~~ has a diameter of about 3 μm to about 4 μm.

19. (original) The method of claim 2 wherein translation of the focus once along the scan path induces a refractive index increase of more than about 0.0001.

20. (original) A product made by the process of claim 2.

21. (currently amended) The product of claim 20 wherein the product is a device selected from the group consisting of a Y-coupler, a directional coupler, a star coupler, a Mach-Zehnder device, a loop mirror, a demux coupler, ~~a~~ an Er-doped single- or multi-stage amplifier, and devices having surface-modified thermal, piezoelectric, or trench-type activators.

22. (original) A diffraction grating made by the process of claim 2.

23. (original) The product of claim 22 wherein the line spacing is about 0.5 μm.

24-41. (canceled)

42. (original) A method of writing a light guiding structure in a bulk glass substrate comprising:

selecting a bulk glass substrate made from a silica-based material doped with a dopant selected from the group consisting of B_2O_3, Al_2O_3 and P_2O_5; and

focusing a pulsed laser beam at a focus within said substrate while translating the focus relative to the substrate along a scan path at a scan speed effective to induce an increase in the refractive index of the material along the scan path relative to that of the unexposed material while incurring substantially no laser induced breakdown of the material along the scan path that would inhibit effectiveness of the scan path as a waveguide.

43-51. (canceled)

52. (original) A method of direct writing a waveguide in a silica-based material substrate comprising the steps of:

producing a pulsed laser beam having a wavelength beyond an absorption edge of the silica-based material substrate and a pulse duration less than 150 femtosconds (fs);

focusing the laser beam to a spot within the silica-based material substrate;

adjusting pulse energy of the laser beam within a range in which an accompanying generation of heat has the effect of saturating refractive index increases associated with incremental increases in the pulse energy; and

relatively translating the beam and silica-based material along a scan path to provide for increasing refractive index along a scan path within the silica-based material while incurring substantially no laser-induced breakdown of the material along the scan path that would inhibit effectiveness of the scan path as a waveguide.

53. (original) The method of claim 52 in which the step of focusing includes focusing the laser beam through a numerical aperture greater than 0.2.

54. (original) The method of claim 53 in which the refractive index increase is saturated at less than 1 microjoule (μJ).

55. (original) The method of claim 543 in which the laser beam has a wavelength of approximately 800 nanometers (nm).

56. (original) The method of claim 55 in which the material is a fused silica and the refractive index increase is saturated at around 0.8 microjoule (μJ).

57. (original) The method of claim 55 in which the material is a borosilicate and the refractive index increase is saturated at around 0.5 microjoule (μJ).

58. (original) The method of claim 54 in which the step of producing includes producing the laser beam with a repetition rate that is slower than a thermal diffusion rate of the silica-based material so that each pulse heats the material independently of adjacent pulses.

59. (original) The method of claim 58 in which the pulse duration is less than 50 femtoseconds (fs).

60. (canceled)